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Sections 210 through 216

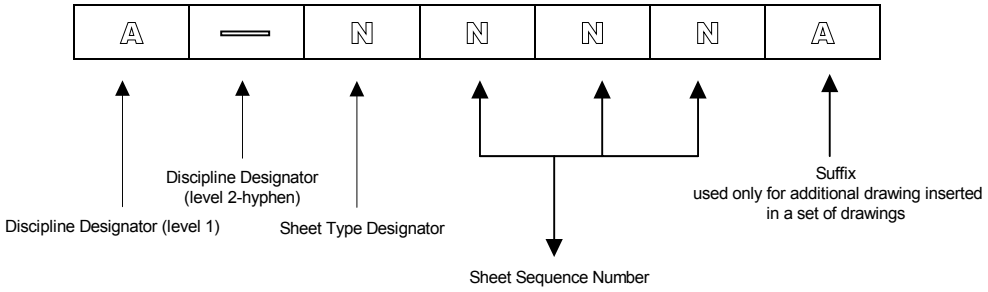
RECORDS OF REVISION

Rev.	Date	Description	POC	OIC
0	06/29/99	Document rewritten and reformatted to support LIR 220-03-01, Facility Engineering Manual. This chapter supersedes LANL Facility Engineering Standards Drafting Manual, Vol. 2, Rev. 7, dated 4/17/98.	Danny Nguyen, *PM-2*	Dennis McLain, *FWO-FE*
1	10/29/01	Discipline ID & sheet numbering changed to NCS; text standardized; electronic file naming convention expanded & defined.	Richard Trout, *FWO-SEM*	Mitch S. Harris, *FWO-SEM*
2	07/15/02	Minor Changes: Editorial changes for correction/clarification throughout, as indicated by revision bars.	Richard Trout, *FWO-SEM*	Kurt Beckman, *FWO-SEM*

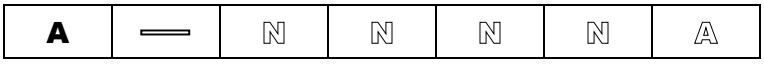
210 DRAWING SET ORGANIZATION

1.0 STANDARD SHEET IDENTIFICATION (NUMBERING)

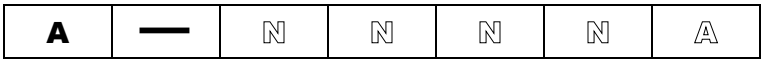
The required sheet identification format is applicable to all drawing production. It is consistent, yet flexible enough for a wide range of project scopes. The Uniform Drawing System (UDS) by the Construction Specifications Institute (CSI) sheet identification format depicted here has three components:



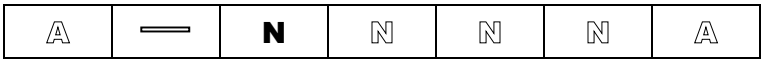
LEVEL 1: Discipline designator, consisting of 1 alphabetical character,



LEVEL 2: Discipline designator, is not used, replace with a hyphen,

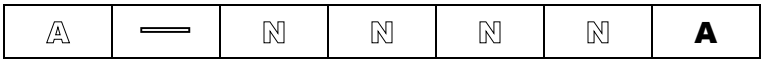


The **Sheet Type Designator,** identifies the type of information on the sheet and is followed by the **Sheet Sequence number**. **Sheet Type designator,** consisting of 1 numerical character,



Sheet Sequence number, consisting of 3 numerical characters.

Supplemental Drawing Sheet



The one-character **Discipline designator** identifies the sheet as a member of a subset.

Within the discipline designator, the first character is the discipline character, and the second is the modifier character. The discipline character identifies the creator of the drawings on the sheet. The modifier character is used to further subdivide the information for a specific use or purpose (i.e., M-1001 = Mechanical, Plan, Sheet 001). Refer to Uniform Drawing System Module 1 for further information.

2.0 LEVEL 1 - DISCIPLINE DESIGNATOR

The first component of the sheet identification format, the discipline designator, is based on the traditional system of alphabetical discipline designators.

A. Organize the drawing sets by discipline in the following order (as applicable):

Order Sequence	Discipline Code	Discipline
1	G	General (Title Sheet, General Notes, Scope of Work, Submittals)
2	H	[1] Hazardous Materials
3	V	Survey/Mapping
4	B	Geotechnical
5	W	[1] Civil Works (User Defined)
6	C	Civil
7	L	[1] Landscape
8	S	Structural
9	A	Architectural
10	I	Interiors
11	Q	Equipment (laboratory, food service parking lot, site)
12	F	Fire Protection
13	P	Plumbing
14	D	[2] Process (e.g., gloveboxes and process piping to and from gloveboxes), fumehoods and process equipment
15	M	Mechanical
16	E	Electrical
17	T	Telecommunications
18	D	[1] Resources
19	R	Other Disciplines (i.e., Safeguards & Security)
20	X	[1] Contractor/Shop Drawings
21	O	Operations

[1] Uniform Drawing System (UDS) discipline code not used at LANL.

[2] UDS discipline code modified for LANL application.

3.0 SHEET TYPE DESIGNATOR

A. The second component of the sheet identification format is the sheet type designator. The sheet type is identified by a single numerical character. All sheet types may not apply to all discipline designators. It is not necessary to use all the sheet types for a project or within a discipline.

B. Organize the Sheet Types in the following order (as applicable):

TABLE 210-1

0	**General** (symbols legend, notes, etc.)
1	**Plans** (horizontal views)
2	**Elevations** (vertical views)
3	**Sections** (sectional views)
4	**Large Scale views** (plans, elevations, or sections that are not details)
5	**Details**
6	**Diagrams**
7	**Schedules**
8	**User Defined** (for types which do not fall in other categories)
9	**3D Representations** (isometrics, perspectives, models, and photographs)

4.0 SHEET SEQUENCE NUMBER

A. The third component of the sheet identification format is a three-digit sheet sequence number that identifies each sheet in a series of the same discipline and sheet type. The first sheet of each series is number **000**, followed by **001** through **999**. (A three (3) - digit sequence number is required for efficient electronic file sorting and facility management databases.)

A	—	N	**N**	**N**	**N**	A

B. On plan sheets, it may be desirable to replicate the floor name within each discipline. This makes sheets **A-1002, M-1002,** and **E-1002** the second floor plan for each of the various disciplines. This system may become cumbersome when basements and mezzanines or split level plans are involved. Evaluate each project carefully before deciding to implement this option.

C. Additional drawings inserted in a set of drawings after a sheet identification organization has already been established can be identified with a suffix. *This suffix may be comprised of a defined designator; starting with the letter "A."*

211 ARRANGEMENT AND NUMBERING SEQUENCE

1.0 DRAWING SETS

A. Shall be arranged in a defined order and assigned a unique number, within each discipline, as specified in Table 211-1.

Note: Drawing sets will not always include all of the types of drawings listed below, and show the commonly used disciplines:

TABLE 211-1

Discipline	Numbering Sequence	Order of Drawings
(G) General	0001 - 0999	General (Title Sheet, Legend, General Notes; Scope of Work, and Construction Sequence, Orientation Maps)
(V) Survey / Mapping	0001 - 0999	General (Legend, General Notes; Scope of Work, and Construction Sequence)
	1000 - 1999	Plans, (Demolition/New Construction), Boundary, Contour, Archaeological, and historical features
	2000 - 2999	Elevations
	3000- 3999	Sections
	4000 - 4999	Large Scale Views (Plans, Elevations, or Sections that are not details)
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)
(B) Geotechnical	0001 - 0999	General (Legend, General Notes; Scope of Work, and Construction Sequence)
	1000 - 1999	Plans (Demolition/New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views (Plans, Elevations, or Sections that are not details)
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)

Discipline	Numbering Sequence	Order of Drawings
(C) Civil	0001 - 0999	General (Legend, General Notes; Scope of Work, and Construction Sequence)
	1000 - 1999	Plans (Site, Grading, Utility, Soil Boring logs, Plan & Profile, Demolition/New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views (Plans, Elevations, or Sections that are not details)
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)
(S) Structural	0001 - 0999	General (Legend, General Notes; Scope of Work, and Construction Sequence)
	1000 - 1999	Plans (Demolition/New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views (Plans, Elevations, or Sections that are not details)
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)
(A) Architectural	0001 - 0999	General (Legend, General Notes; Scope of Work, and Construction Sequence)
	1000 - 1049	Reserved for Record Floor Plans
	1050 - 1999	Plans (Demolition than new construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)

Discipline	Numbering Sequence	Order of Drawings
(I) Interiors	0001 - 0999	General (Legend, General Notes; Scope of Work, and Construction Sequence)
	1000 - 1999	Plans (Demolition/New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views (Plans, Elevations, or Sections that are not details)
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)
(Q) Equipment	0001 - 0999	General (Legend, General Notes; Scope of Work and Construction Sequence)
	1000 - 1999	Plans (Demolition & New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000- 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)
(F) Fire Protection	0001 - 0999	General (Legend, General Notes; Scope of Work and Construction Sequence)
	1000 - 1999	Plans (Demolition & New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules,
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)

Discipline	Numbering Sequence	Order of Drawings
(P) Plumbing [1]	0001 - 0999	General (Legend, General Notes; Scope of Work and Construction Sequence)
	1000 - 1999	Plans (Demolition & New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules and Lists
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)
(D) Process	0001 - 0999	General (Legend, General Notes; Scope of Work and Construction Sequence)
	1000 - 1999	Plans (Demolition & New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams (Process Flow, Piping & Instrumentation for process systems, gloveboxes and fume hoods)
	7000 - 7999	Schedules, Lists
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs, risers)
(M) Mechanical [2]	0001 - 0999	General (Legend, General Notes; Submittals, Scope of Work Construction Sequence, Schedules)
	1000 - 1999	Plans (Demolition & New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams (PFDs, P&IDs, Logic)
	7000 - 7999	Schedules, Lists
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)

Discipline	Numbering Sequence	Order of Drawings
(E) Electrical	0001 - 0999	General (Legend, General Notes; Scope of Work and Construction Sequence)
	1000 - 1999	Plans (Demolition & New Construction) (floor, equipment, power, lighting, grounding, lightning, emergency, special systems)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams (one-lines, ladder grounding lightning wiring, logic, schematics (control systems i.e.: PLC cabinet), Riser - Fire Alarm Public Address Communication Security.
	7000 - 7999	Schedules (Bill of Material, Nameplate, etc.)
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)
(T) Tele-communication	0001 - 0999	General (Legend, General Notes; Scope of Work and Construction Sequence)
	1000 - 1999	Plans
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)
(R) Other Disciplines **(i.e., Security & Safeguards)**	0001 - 0999	General (Legend, General Notes; Scope of Work and Construction Sequence)
	1000 - 1999	Plans (Demolition & New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)

Discipline	Numbering Sequence	Order of Drawings
(O) Operations	0001 - 0999	General (Legend, General Notes; Scope of Work and Construction Sequence [for construction by Support Services Subcontractor only], Schedules/Lists)
	1000 - 1999	Plans (Demolition & New Construction)
	2000 - 2999	Elevations
	3000 - 3999	Sections
	4000 - 4999	Large Scale Views
	5000 - 5999	Details
	6000 - 6999	Diagrams
	7000 - 7999	Schedules
	8000 - 8999	User Defined
	9000 - 9999	3D Representation (isometrics, perspectives, photographs)

[1.] Drainage (gravity/pumped, vent, potable and nonpotable water systems).

[2.] Air conditioning, ventilation, cooling, heating, refrigeration, fuel oil, compressed air, laboratory gas steam and condensate systems.

2.0 PRIORITY DRAWINGS

A. *Guidance: Priority Drawings typically consist of piping and instrument diagrams (P&IDs), flow diagrams, and electrical one-line diagrams helpful to the safe operation and shutdown of a facility. Other types of drawings such as architectural drawings, mechanical prints, floor plans, piping schedules, or databases may be included if facility requirements dictate.*

B. The importance of the system and its documents (e.g., drawings) shall be determined by the Facility Manager for new and existing facilities in regards to control of nuclear and non-nuclear hazards, the safety of the public, environment, worker (i.e., hazard class, hazard category, etc.), and the facility mission (LIR240-01-01, Configuration Management).

C. A priority drawing shall have the words “PRIORITY DRAWING” stamped in black or electronically inserted on the sheet, 1/4” text height, layer “PRIORITY,” color white, Romand font. The words shall appear just above the title block space allocated for revisions. Refer to the LEM P&ID sample drawings for an example.

212 LINE WORK

1.0 BASIC LINE WIDTHS

A. *Guidance:*

1. *Use a heavy line width to indicate new construction for a given discipline.*
2. *Use a medium line width for text and to delineate new construction above or below the drawing plane.*
3. *Use a light line width to delineate existing construction or new background base plans, and for dimension lines, leader lines and extension lines.*

B. Contrast the three line widths definitively as illustrated below:

LINE DESCRIPTION	LINE APPEARANCE	LINE TYPE	LINE WIDTH
CENTER LINE		CENTER	0.25 MM 0.010 INCH
DIMENSION LINE		CONTINUOUS	0.25 MM 0.010 INCH
LEADER LINE		CONTINUOUS	0.25 MM 0.010 INCH
FUTURE CONSTRUCTION		DASHED	0.25 MM 0.010 INCH
EXISTING CONSTRUCTION		PHANTOM	0.25 MM 0.010 INCH
HIDDEN LINE		HIDDEN	0.35 MM 0.015 INCH
NEW CONSTRUCTION AND REVISION CLOUD		CONTINUOUS	0.50 MM 0.020 INCH
NEW CONST. BACKGROUND		CONTINUOUS	0.25 MM 0.010 INCH
MATCH LINE		CENTER	0.60 MM 0.025 INCH
EXISTING TO BE REMOVED		PHANTOM	0.25 MM 0.010 INCH LINE 0.50 MM 0.020 INCH ASTERISK
P&ID PROCESS LINES, SECTION CUTS, HIGHLIGHT BOX AROUND TEXT		CONTINUOUS	0.80 MM 0.032 INCH
HATCH LINES	VARIES	VARIES	0.25 MM 0.010 INCH LINE

Figure 212-1

213 STANDARDIZATION OF TEXT

1.0 FONT STYLES AND TEXT SIZE REQUIREMENTS

A. Use only standard AutoCAD fonts: Romans and Romand. Do not use stylized fonts or fonts not standard to AutoCAD.

B. Fonts other than Romans and Romand can be used on the title sheet (Section 203) for the Design Agency logos. If a logo contains a font that is not standard to AutoCAD, convert the logo to a drawing or change the logo to an electronic format that can be read by the standard AutoCAD package.

C. Match the existing font style and height for uniformity of presentation when revising existing drawings.

D. The minimum text height in the drawing field on C and D size sheets is 1/8 inch.

E. The minimum text height in the drawing field on A and B size sheets is 3/32 inch.

F. The minimum text height only applies in circumstances when another convention is not specified in this document.

2.0 TEXT FORMATTING CONVENTIONS

A. Create all text in upper case letters, with the exception of certain unit designations such as kVA, mm, kHz, Vac, Vdc, mA, which are recognized as an industry standard.

B. Use text that is readable when reduced to one-half size on half-size drawing sets.

C. Leave a minimum space of one-half the text height between text lines and special marks to maintain legibility.

D. Maintain standard text conventions across disciplines in a drawing set.

E. Orient text to read horizontally from left to right and/or vertically from the bottom to the top of the sheet.

F. Font width factor shall be a “1” unless otherwise specified in this manual.

G. When inserting text into a D or E size drawing comply with the following:

TEXT FOR	EXAMPLE	LINE WIDTH	FONT
MAIN TITLE	ABCDEFG RSTU 1/4" WXYZ 1/4"	0.50 MM 0.020 INCH	ROMAND
SUB TITLE	ABCDEFG RSTU 3/16" WXYZ 3/16"	0.35 MM 0.015 INCH	ROMAND
ALL TITLE BLOCK TEXT	(SEE SECTION 202 FOR CHARACTER SIZE)	0.35 MM 0.015 INCH	SEE SECT. 202 FOR FONT
ALL OTHER TEXT	MINIMUM SIZE TEXT ABCDEFG VWXYZ 1/8" ABCDEFG VWXYZ 1/8"	.035 MM 0.015 INCH	ROMANS

Note: The "Sub Title" designation referred to in the table above is most commonly used in schedules. The schedule title is the main title (1/4" Romand) and the column headers for the schedule are the sub titles (3/16" Romand).

214 SECTIONS, ELEVATIONS, DETAILS, AND CALLOUTS

A. Identify sections, elevations, and details by referencing them with symbols or callouts.

B. Font width in detail, elevation, and section bubbles shall be 0.75.

1.0 REFERENCE DESIGNATIONS

Identify sections and elevations by **LETTERS**, and details by **NUMBERS**. Reference sections, elevations and details with the discipline sheet number, for example: A1, C1, S1, …

2.0 PROTOCOL FOR REFERENCES AND CALLOUTS

A. On the sheet where details, sections or elevations are drawn, number or letter them independently by sheet, as opposed to consecutively by discipline or project. Order the numbers and letters sequentially in each drawing sheet that contains elevations, details or sections. Begin with the number 1 for details, and the letter "A" for the elevation or section designation.

B. When a detail or section is eliminated, the deleted detail or section number or letter may be reused or left blank. The details or sections do not have to be renumbered as the result of a deletion.

3.0 EXAMPLES OF PROTOCOLS

A. A section, detail or elevation drawn on the same with a plan or collectively is not permitted.

B. A detail, section or elevation **not** drawn on the sheet it is referenced or cut:

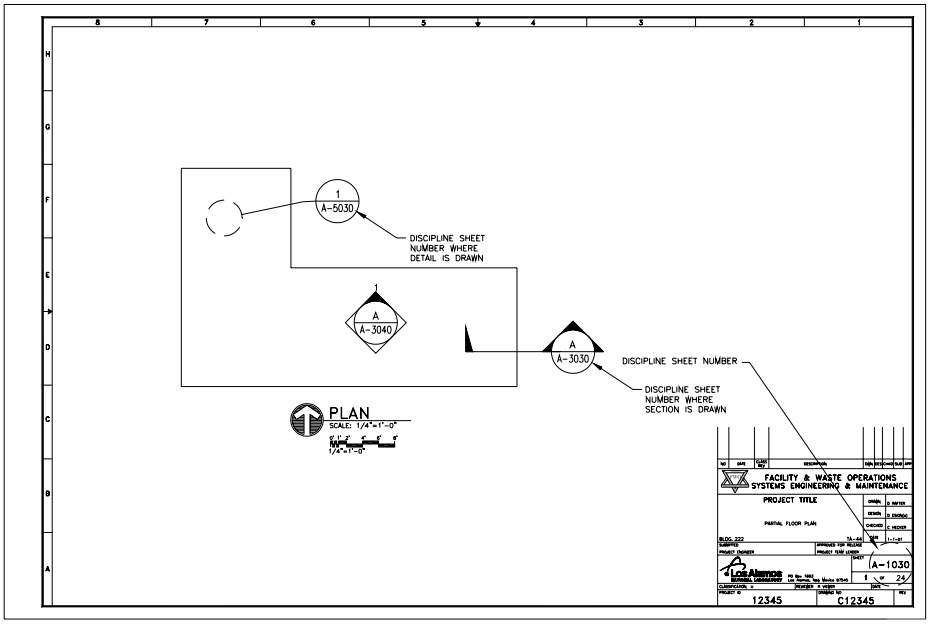


Figure 214-1

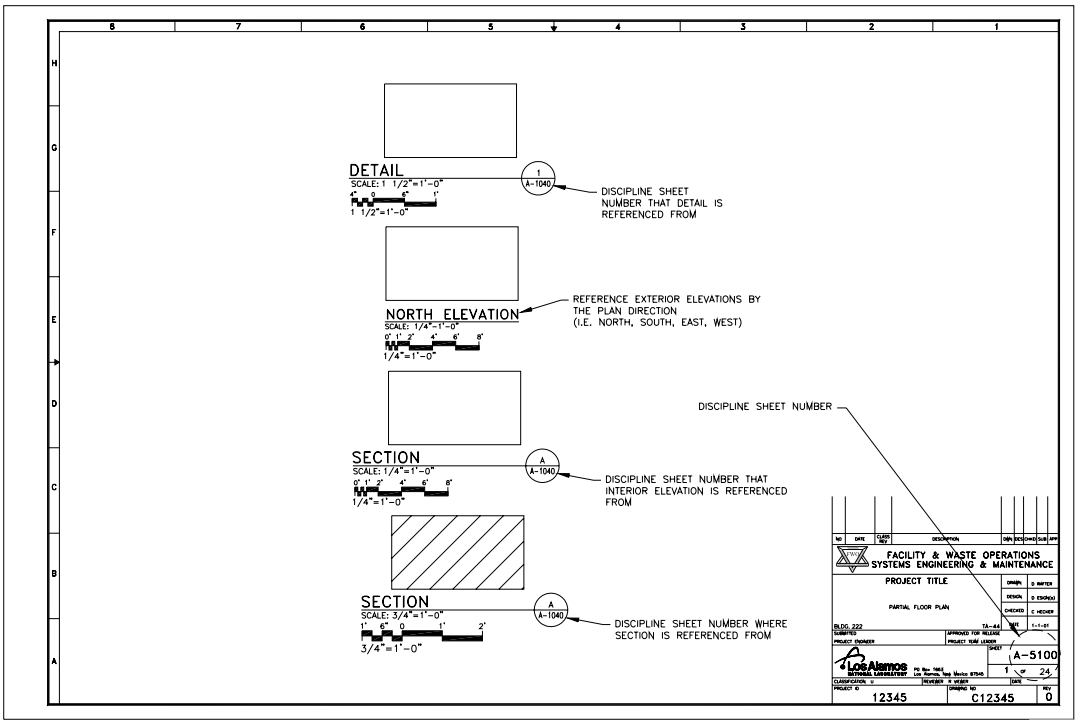


Figure 214-2

4.0 SECTION SYMBOLS

A. Standard Section Symbol:

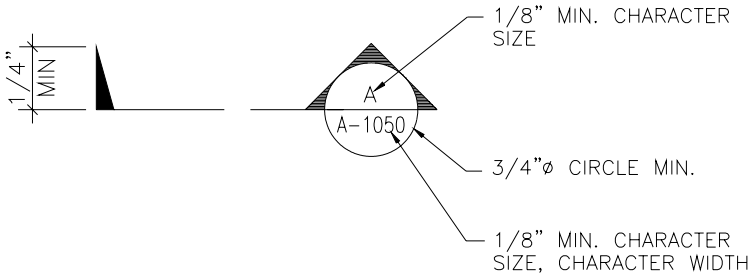


Figure 214-3

B. Acceptable Section Symbols when space for referencing is severely restricted:

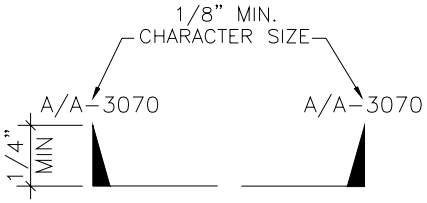


Figure 214-4

C. Detail Symbol

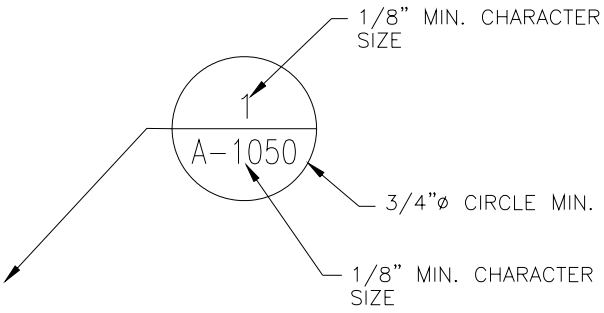


Figure 214-5

5.0 SECTION, ELEVATION, AND DETAIL TITLES

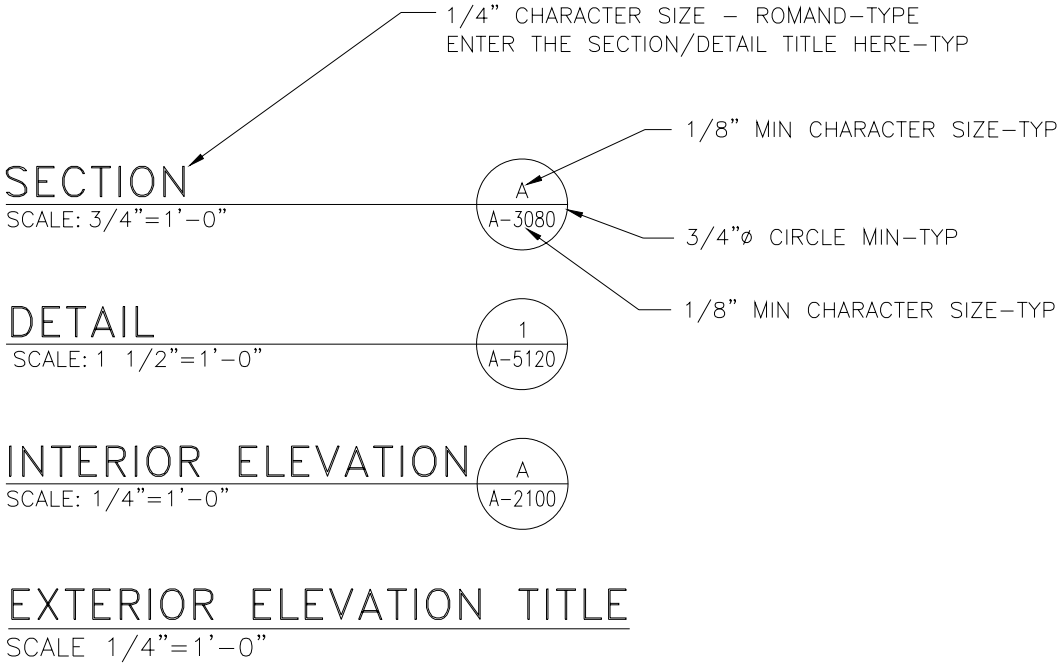


Figure 214-6

6.0 INTERIOR ELEVATIONS SYMBOL

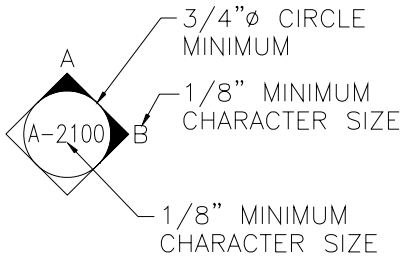


Figure 214-7

7.0 EXTERIOR ELEVATIONS

Reference exterior elevations by the plan direction (i.e., North, South, East, and West).

8.0 KEYED NOTES

A. Use keyed notes where space is limited in the drawing field.

B. Number keyed notes independently by sheet, as opposed to consecutively by discipline or project.

C. Begin numbering keyed notes on each sheet that contains keyed notes with the number one. Number each note sequentially in ascending order.

D. If a keyed note is deleted, insert the comment "not used" in place of the deleted note or re-use the number for another note. It is not necessary to re-number keyed notes because of a deletion.

E. When a keyed note is used, show the keyed note legend on the same sheet where reference is made. See Figure 202-1 for location of the Keyed Note legend.

F. Do not use keyed notes for dimensions, air flows (CFMs), or under any other circumstances that are inappropriate.

G. The keyed note symbol is an oval with a number designation. The standards established for text apply to the numeric character in the keyed note bubble. See Figure 214-8 for an example of the Keyed Note style. General Symbol G-46 and G-47 (Appendix B) establishes keyed note bubble size and “Keyed Notes” legend header.

H. The following is the example of the format for the keyed note legend.

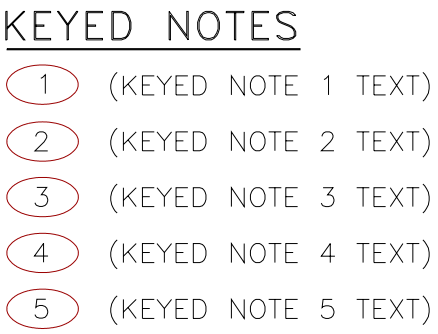


Figure 214-8

9.0 GENERAL NOTES

A. When a general note is used, show the general notes on the same sheet where reference is made.

B. The General Notes legend shall be located below the "keyed note" legend as shown in Figure 202-1.

C. The General Notes legend header shall be the same as the keyed note header established in General Symbol file number G-46 of Appendix B.

D. The following is the example of the format for the general note legend:

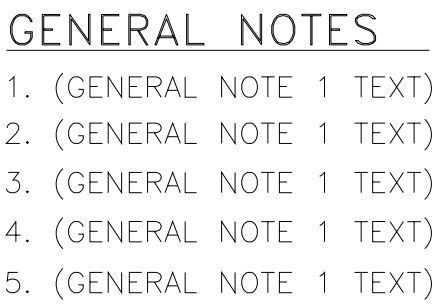


Figure 214-9

215 ELECTRONIC CAD FILE CONVENTIONS

1.0 ELECTRONIC FILE NAMING CONVENTION

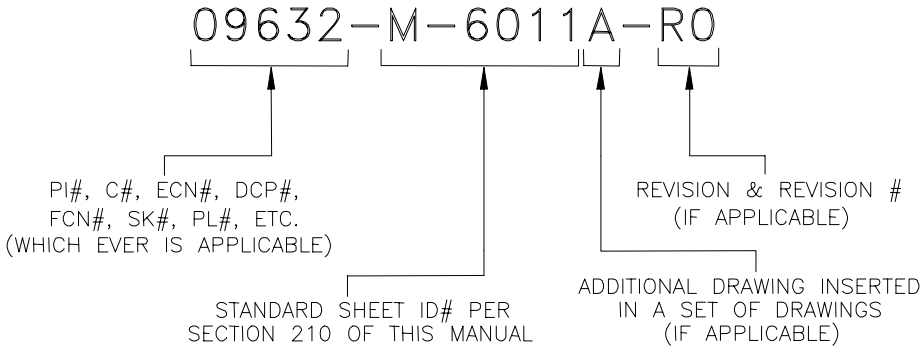
A. One complete set of electronic files shall be placed on CD(s) and sent to FWO-SEM CM Team (TA-3, Building 410, Room 109) via a transmittal letter itemizing the contents and confirmation that the project has been approved and completely signed off for construction and as-builts.

B. Affix a stick-on label to the CD with the following completed data:

- LANL Project ID#
- LANL Drawing # (C#) or ECN#, DCP#, FCN#, SK#, or PL#
- TA and Building
- Title of Project
- Number of electronic files submitted: X of X

C. Each drawing file on the electronic CD shall contain:

- Project Identification (PI#) or Drawing # followed by the sheet identification number:



D. CD's that contain classified information shall be identified as such per S-7 and/or ADC instructions.

2.0 LINE WIDTH ASSIGNMENT IN ELECTRONIC FILES

Assign lines a width by creating the line or entity in an appropriate layer. Each layer is assigned a color for the desired line width of entities created in that layer. As indicated in the table below, colors 1 through 15 are the extent of the allowable color range for LANL projects.

	Color Number	Line Width in mm	Line Width in Inches
Red	1	0.50	0.020
Yellow	2	0.50	0.020
Green	3	0.50	0.020

	Color Number	Line Width in mm	Line Width in Inches
Cyan	4	0.50	0.020
Dark Blue	5	0.35	0.015
Magenta	6	0.35	0.015
White	7	0.35	0.015
Dark Gray	8	0.35	0.015
Light Gray	9	0.25	0.010
Red	10	0.25	0.010
Mauve	11	0.25	0.010
Dark Red/Brown	12	0.25	0.010
Light Red/Brown	13	0.70	0.030
12	14	0.70	0.030
Brown	15	0.50	0.020

3.0 CAD Layering Guidelines

3.1 Maximum Number of Layers

Fifty (50) is the preferred maximum for the number of layers in a drawing file. In extreme cases, it is acceptable to increase the number of layers to a maximum of 100.

3.2 Layer Naming Convention

Use the US National CAD Standard Version 2 (or later) AIA CAD Layer Guidelines "short format" layer names for establishing layer names for all drawings. The only exceptions to those guidelines are:

4. The addition of a "G" (for general) group in the major groups. The "G" major group is added for general information that is not discipline specific, such as Title Blocks, Title Sheets, Submittal, and General Notes sheets and Symbols that are applicable to all disciplines.
5. Do not exceed 16 characters in assigning any layer name. This allows for the addition of extra characters that are added to the layer name automatically when X-Refs are used and eventually bound to the file.

4.0 Electronic File Format for Final Deliverables

A. If another graphics software was used to create a drawing file, deliver the file in a format that can be recognized by and converted to AutoCAD (i.e.: ASCII format, DXF file).

B. It is preferred that only standard AutoCAD Release 14 or 2000 options be used in creating drawing files, but third party software that is completely compatible and supportable by AutoCAD Release 14 or 2000 is acceptable.

C. Not all contractors and subcontractors have AutoCAD release 2000. All electronic files created in AutoCAD 2000 shall be saved as AutoCAD 14.

D. The deliverable media for electronic files are CD disks. The entire project file can be stored on one CD, provided it fits. Label the disk with the official **PROJECT NAME, LANL PROJECT ID, DRAWING NO.(s), STAGE/PHASE** (Title II, Engineering Study, etc), **DATE SUBMITTED, ACAD VERSION/WORD PROCESSING PROGRAM** used to create the documents, **DESCRIPTION OF DOCUMENTS** contained on the disk. It should also be noted if any third party add on software packages were used to augment the standard AutoCAD package.

E. A "read me" file is required if special instructions are needed for other users to understand the drawing files.

F. Bind all externally referenced (X-REF) drawing files using the X-REF Bind command sequence. Refer to the AutoCAD Users Guide for instructions on binding x-refs.

G. Identify the plotting scale on the drawing file as well as on the delivered media.

H. It is not necessary to identify the plotting scale if it is 1:1.

I. The preferred plotting scale is 1:1. If the scale is different than 1:1, then indicate the scale on the drawing file and the deliverable label.

- To minimize potting discrepancies for color; dithering; gray scale; pen assignments; screening; line-type; line weight; end styles; join styles; and fill styles, set the AutoCAD plot style to selection “2000-STD-Pens.” Refer to the AutoCAD Users Guide, “Plotting Your Drawing” for assistance in setting this plotting style.
- Shading (if required) in a drawing shall be done by using the standard AutoCAD Hatch Patterns.

J. Final deliverables shall be “As-Built” documents with the conversion requirements implemented from Section 103, “As-Built Revision Procedures” of this manual.

K. “Purge” all unnecessary blocks, text styles, and layers on all drawings prior to electronic FWO-SEM submittals. Refer to the AutoCAD Users Guide for the “purging” procedure.

216 FOLDING DRAWING PRINTS

1.0 PRINT FOLDS

A. *Guidance: Drawing sizes "B" through "E" and roll sizes are normally folded after printing to 8 1/2 x 11 inches to fit standard-size file folders and filing cabinets. See Figure 216-1*

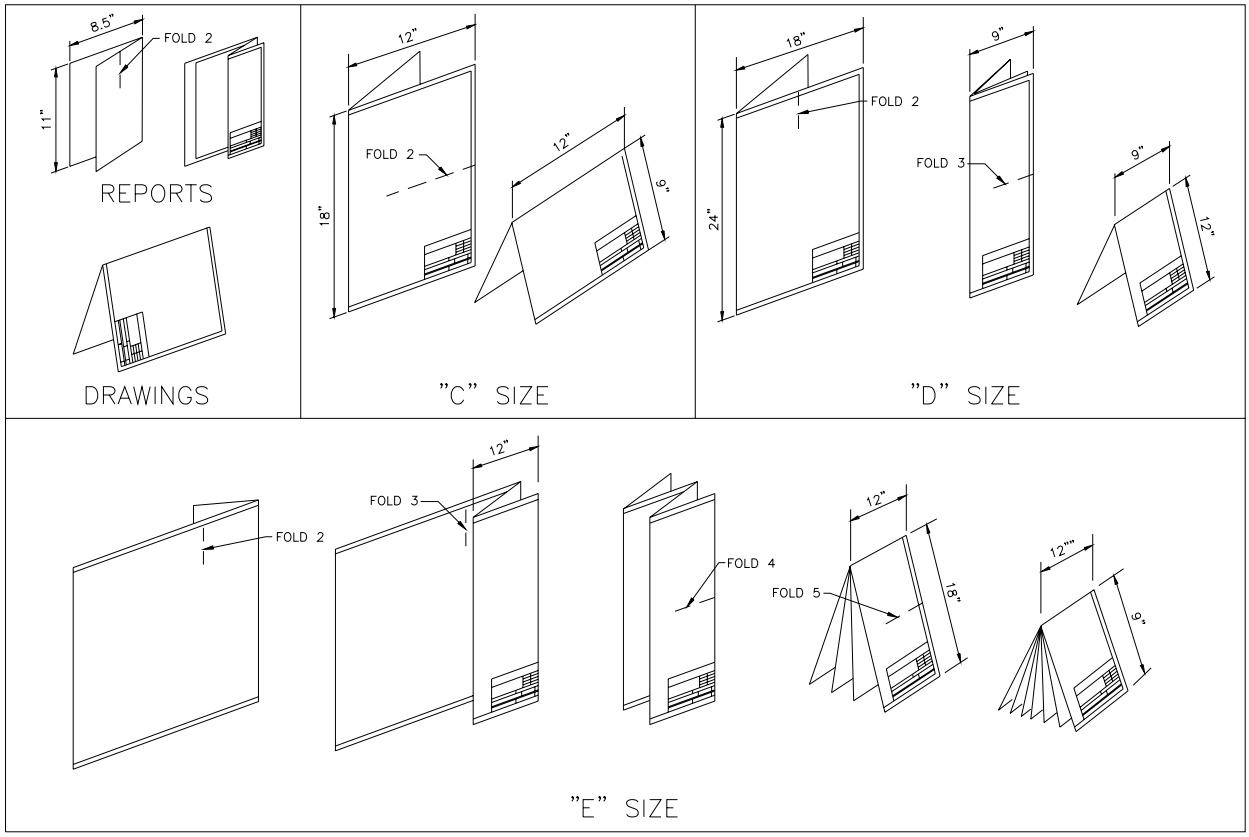


Figure 216-1

Global Engineering Documents (10th Edition)